5 The Calculator

The small, hand-held calculator contains a microprocessor, memory, display, power supply and input buttons. It can be mass manufactured in large enough quantities that these devices can be sold very inexpensively.

6 Smart Cards

The Smart Card is like a calculator with additional memory and functions built into it. It is used for many types of applications, such as electronic ID systems that provide secure access throughout corporate offices, maintaining personal medical or financial account histories, and other single-purpose uses. A number of the prior art for Smart Cards and related devices demonstrate the feasibility of the present invention, including:

(a) Systems for storing and transferring data between persons based on portable electronic devices (U.S. Pat. No. 4,007,355, February 1977, Moreno and U.S. Pat. No. 4,092,524, May 1978, Moreno),

(b) A portable element of reservation systems, for receiving, storing, displaying and outputting digital data (U.S. Pat. No. 4,298,793, November 1981, Melis et al.),

(c) A credit card with a memory, including plural memory fields, for keeping accounts with predetermined homogeneous units (U.S. Pat. No. 4,367,402, January 1983, Giraud et al.),

(d) A data processing card system that may be carried by a user for insertion into external terminal devices, which actuates the data processing card system (U.S. Pat. No. 4,539,472, September 1985, Poetker et al.),

(e) A system for transferring electronic funds by means of portable modules which connect to resident units for transferring data between units or to a central computer (U.S. Pat. No. 4,625,276, November 1986, Benton et al.),

(f) An apparatus that accepts data from a people monitoring system (which is attached to a television set), stores the data and transmits it to a removable local unit that stores it (U.S. Pat. No. 4,642,685, February 1987, Roberts et al.),

(g) A voice recording card can record and reproduce messages, and transmit and receive messages (U.S. Pat. No. 4,677,657, June 1987, Nagata et al.),

(h) An IC card for operating machines such as automatic cash machines and ID systems, including a display for displaying stored data, an IC card reader for reading the IC card, and transmitting/receiving means for updating the data (U.S. Pat. No. 4,746,787, May 1988, Suto et al.),

(i) An intelligent card that includes a keyboard, display and IC chip, designed to provide secure identification of the card's holder (U.S. Pat. No. 4,749,982, June 1988, Rikuna et al.),

(j) A customer service system that stores customer service information in an IC card, and displays it on the card's display, based on menu selections by the person holding the card (U.S. Pat. No. 4,752,677, June 1988, Nakano et al.),

(k) An IC card system compatible with a bank account system, including account maintenance, money transfers and the functions of credit and debit cards (U.S. Pat. No. 4,839,504, June 1989, Nakano),

(l) A portable data carrier that stores more than one bank and/or credit account number and data, and provides account information by means of a display (U.S. Pat. No. 4,859,837, August 1989, Halpern),

(m) An intelligent portable interactive personal data system (U.S. Pat. No. 4,868,376, September 1989, Lessin et al.),

(n) A smart card apparatus and method of programming it, including a smart card control program and a data dictionary (U.S. Pat. No. 4,874,935, October 1989, Younger),

(o) A method and system for using facsimile machines to perform electronic funds transfer (U.S. Pat. No. 4,960,981, November 1990, Benton, et al.),

(p) A portable electronic keysafe system (e.g., a secure lock) that stores data, along with a stand to interface with a computer, and a computer that programs the lock (U.S. Pat. No. 4,988,987, January 1991, Barrett et al.),

(q) A data collection system useful for trade shows employing a card containing a memory chip for recording and storing the data of individuals (U.S. Pat. No. 5,019,697, May 1991, Postman), and

(r) A portable interactive medical test selector that displays questions to a patient, stores answers and analyzes the answers to recommend appropriate medical tests (U.S. Pat. No. 5,025,374, June 1991, Roizen et al.).

This invention combines the prior art in a new distributed system whose components reside:

In products (as defined by this invention),

At vendors, and

Throughout the marketplace or throughout an enterprise (when built into its internal business and computing systems).

Some of its technology parallels include:

Bank Automated Teller Machines (ATMs), in which simplified local interactions with individual customers are linked to centralized systems via marketwide networks, to provide immediate personal services across markets and large geographic regions.

Automobile racing, in which key systems of a race vehicle are monitored by sensors, and combined with direct voice communications with the driver, to gain the clearest possible computer display and understanding of the driver's problems and needs, and to gain the new competitive abilities of supporting the driver so that the driver has the best possible chance to perform better than competitors.

The worldwide telephone network and linked voice mail systems, in which individual local users, who may be located anywhere, operate the global phone network and attached voice mail systems with a small keypad of ten numbers (0-9) and two buttons (# and *), illustrating how a simple means for a user to interface with a product or service may control and communicate with complex systems that are widely distributed.

What are Products and Services?

The departure from this prior art comes from fundamental re-definitions: Physical products and many types of services are really high-level concepts that use specific physical designs of products and service concepts to engage customers and attempt to satisfy their needs, desires and expectations. This is inevitably imprecise, and customers flexibly and individually determine how they will use the products and services that they buy. Thus, any one embodiment of a physical design is temporary and subject to improvements, even though it may look permanent at any one moment.

Vendors typically use market research to discover unfilled user needs and create new product and service designs that might capture valuable market share. The resulting physical products and services are therefore the current conceptual embodiment of a vendor's current knowledge of customer and user needs. As this knowledge is improved, the physical and process designs of products and services are altered. Thus, we propose that the current designs of products and